APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/586,115	06/02/2000	Rodolfo Milito	P3807	6216

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CENTRAL COAST PATENT AGENCY
PO BOX 187
AROMAS, CA 95004

EXAMINER
HIRL, JOSEPH P

ART UNIT	PAPER NUMBER
2121	7

DATE MAILED: 04/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/586,115	MILITO ET AL.
	Examiner	**Art Unit**
	Joseph P. Hirl	2121

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>27 February 2003</u> .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-23</u> is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-23</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

     If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☐ All b)☐ Some * c)☐ None of:

         1.☐ Certified copies of the priority documents have been received.

         2.☐ Certified copies of the priority documents have been received in Application No. _____ .

         3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

     a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)	4)☐ Interview Summary (PTO-413) Paper No(s). _____ .
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5)☐ Notice of Informal Patent Application (PTO-152)
3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .	6)☐ Other: .

Wilbert L. Starks, Jr.
Primary Examiner
Art Unit - 2121

DETAILED ACTION

1.   Claims 1 and 12 have been amended. Claims 1-23 are pending in this application.

2.   The prior office actions of July 31, 2002 and December 9, 2002 are fully incorporated into this Final Office Action by reference.

3.   The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

Claim Rejections - 35 USC § 101

4.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1 and 12 rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility. The concept of "…numbers intervals arbitrarily between breakpoints in sequential ascending binary numbers…" is an oxymoron. Arbitrary conveys a sense of random effect wherein of an assortment of n items, any one of the items could be selected since each has an equal probability. An n item is a random selection of a number…to any base. Hence, "numbers intervals arbitrarily" can

mean any value to any interval wherein such value could also be repeated. Under this condition, to "effect intervals between breakpoints in sequential binary numbers" would only occur very infrequently and in a most random fashion. Page 12 of the specification does not address "arbitrary numbering" as was referenced by the Applicant on page 10, line 15 of Amendment A dated February 27, 2003. It is axiomatic that inventions expressed in contradictory terms have no utility.

Claim Rejections - 35 USC § 112

5.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 12 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Fig. 2 of the specification establishes that the interval numbering (center column) is not arbitrary. It is sequentially binary. The immediate above comments also apply.

Response to Arguments

6.   Applicant's arguments filed on February 27, 2003 related to Claims 1-23 have

been fully considered but are not persuasive.

In reference to Applicant's argument:

Applicant respectfully traverses the Examiner's statement. Applicant argues that Lakshman's Fig. 2
clearly fails to show numbering breakpoints representing marking the beginning and ending value on
each axis for each rule. As seen in Fig. 2 of Lakshman the dotted lines extending to the x and y-axis from
the rectangular objects are not numbered. For example, X1 including binary number 1000, represents
intervals, not breakpoints as claimed.

Examiner's response:

Paragraph 4.1 of Lakshman addresses Packet Classification based on Bit-

Parallelism and is the paragraph that generalizes the 2-dimentional example of Fig. 2

contained in the same paragraph structure. To the point, $r_m = \{e_{1,m}, e_{2,m}, \ldots e_{k,m}\}$

denotes the set of ranges that define rule r_m in the k dimensions. Further, for each

dimension j, $1 <= i <= n$ on the j-axis, extract the jth element of every filter rule for all n

filter rules. There are a maximum of 2n + 1 non-overlapping intervals that are created

on each axis. Each such interval P_j , $1<=j<=k$, the k sets of such intervals are so

denoted. Lakshman continues on page 207, col 2, line 61-63 and page 208, col 1, lines

1-18 to develop the concept of packet classification the evolves into the Example of

page 208, col 2, lines 10-34 that references Fig. 2. To one of ordinary skill in the art,

mathematical notation as identified above and in Lakshman is the accepted way of

relating to numerical representation. The dotted lines of the 2-dimensional Fig. 2

example intersecting the related abscissa and ordinate represent breakpoints

associated with rules 1-4 and numerical values follow from the related notation of

Paragraph 4.1

In reference to Applicant's argument:

Applicant's invention when applying the pre-processing phase must number breakpoints. Said numbering enables a more efficient method for isolating intervals. Referring to applicant's Fig. 3, consider, for example, a first step on the X-axis using the break point 1 C. A compare will show that the point 05 lies to the left of 1 C, eliminating the interval from 1 C to 1 F. One may then select any one of the break points between 0 1 and 1 C , and continue to process, eventually isolating the correct interval. Another possibility, again with reference to applicant's Fig. 3, is to select break points considering the binary value of the break points, at a point that where the most significant bit of the X-value changes. In the example shown in applicant's Fig. 3, OE is 0 11110 and 17 is 10111. In this scheme one would select 17 as the first break point, and the search continues by selecting break points on the axes were the second bit changes, the third bit changes, and so on the fifth bit.

Applicant argues that incorporating the numbering of breakpoints and using the numbered breakpoints as explained above in isolating intervals provides a more efficient and expedient search algorithm. Applicant believes this is a patentable advantage over the art of Lakshman. Although Lakshman states, "using any other efficient search algorithm", this statement cannot anticipate or suggest applicant's method of numbering breakpoints because Lakshman does not disclose numbering breakpoints.

Examiner's response:

Lakshman anticipates binary searches as noted on page 208, col 1, line 8 just

prior to the Applicant's above reference quotation.

In reference to Applicant's argument:

The Examiner states that the concept of "naming" intervals is not found in the specification. Applicant acknowledges that the intervals are not "named" in a broad sense, they are actually "numbered". Applicant herein amends the independent claims to recite that the intervals are arbitrarily numbered in ascending order. Page 12 of applicant's specification clearly discloses the arbitrary numbering of intervals between breakpoints. Applicant's invention as claimed clearly discloses numbering the breakpoints and the intervals formed between them.

Examiner's response:

The above 35 USC § 101 and 35 USC § 112 rejections apply. Paragraph 3

above applies.

In reference to Applicant's argument:

Upon careful and thorough review of Lakshman, particularly the portions cited and applied by the Examiner to support the Examiner's rejections of applicant's claims, applicant is confident that nowhere in a reference of Lakshman is there any disclosure, suggestion or intimation of anything having to do with numbering intervals and break points, wherein the intervals are arbitrarily numbered with sequential ascending binary numbers, or locating the binary numbered interval into which the point projects on each axis by performing a search on each axis for the numbered interval, thereby determining rules applicable to the packet for that axis, as is specifically recited in applicant's base claims 1 and 12.

Examiner's response:

All of the above applies.

In reference to Applicant's argument:

Applicant previously argued, regarding applicant's independent claim 23, that applicant has carefully reviewed page 209, col. 2, lines 56-62, and page 203, col. 2, lines 19-25 of Lakshman, and applicant can find no specific teaching or suggestion in either portion cited of simplifying a search comprising the steps of conducting a first search on one or more axes, and using information from the first search to simplify further searching on remaining axes, as is recited in applicant's claim 23.

The Examiner responds to the above argument stating that Lakshman process searches one dimension to find the interval I on Pj of some k dimension which is the equivalent of the applicant's conducting a first search on one or more axis. Obviously, the Examiner continues, once the Examiner has conducted the binary search for the initial value for j, the following process is simplified since only j-1 remaining dimensions need to be searched.

Applicant argues that having less area to search does not read on using information from the first search to simplify further searching on remaining axes. In Lakshman it is the <u>act of searching</u> the Examiner relies on to read on applicant's claim 23, not using information from the first search to simplify further searching on remaining axes. The teachings of the referenced portions of Lakshman actually have nothing to do

whatsoever with the limitations of applicant's claim 23. Applicant therefore believes that claim 23 is also clearly patentable over Lakshman.

Examiner's response:

Paragraph 3 applies. It is axiomatic that if one has a set j and an operation is performed such as a search that now reduces the set size to j-1, then the only way to proceed to a search on set size j-1 is with the information from the first search that indeed that the first search was performed...albeit other information could be used. The Examiner uses this argument to illustrate to the Applicant the vulnerability that a grossly general claim creates. Since generally effect follows from cause, any act of searching in an iterative sense will have a down stream effect that anticipates the Applicant's claim.

Claim Rejections - 35 USC § 102

7.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Claim 1 – 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Lakshman et al (ACM 1-58113-003, referred to as **Lakshman**).

Claim 1

Lakshman anticipates a first set of rules associating to the packets by values of the header fields (**Lakshman**, page 203, col 2, lines 29 – 35); and a classification

system for selecting specific rules in the set of rules as applicable to a specific packet

(**Lakshman**, page 203, col 2, lines 29 – 35); characterized in that the classification

system projects the first set of rules as N-dimensional entities on N axes in N-

dimensional space, marking the beginning and ending value on each axis for each rule

as a breakpoint, numbers intervals arbitrarily between breakpoints in sequential

ascending binary numbers, associates a subset of the first set of rules as applicable in

each interval between breakpoints on each axis, then considers a packet as a point in

the N-dimensional space according to its header field values, locates the binary

numbered interval into which the point projects on each axis by performing a search on

each axis for the numbered interval into which the point projects on that axis, thereby

determining rules applicable to the packet for that axis, and then determines the specific

rules applicable to the packet from the subsets of rules by selecting those rules as

applicable to the packet that apply to the packet on all of the N axes (**Lakshman**, page

207, col 2, lines 45 – 63, page 208 including Fig. 2; Examiner's Note: a set of

breakpoints constitutes an interval).

Claims 2, 13

Lakshman anticipates the search performed on each axis is a binary search

conducted by selecting breakpoints at which the bits change for the binary numbered

intervals (**Lakshman**, page 209, col 2, lines 59 – 62).

Claims 3, 14

Lakshman anticipates the search performed on each axis is a quatenary or

higher-level M-ary search, where M is a power of 2, conducted by selecting breakpoints

at which the bits change for the binary numbered intervals (**Lakshman**, page 209, col 2, lines 59 – 62; Examiner's Note: quatenary is a looped binary search which has rule depth limits).

Claims 4, 15

Lakshman anticipates association of applicable rules in each numbered interval is made by associating a binary string with each interval, with one bit dedicated to each rule. (**Lakshman**, page 208, col 2, lines 10 – 34).

Claims 5, 16

Lakshman anticipates the rules are associated to bit positions in the binary string by priority, the order of priority according to bit significance, and a final rule is selected by the most significant 1 in the matching rules. (**Lakshman**, page 208, col 2, lines 10 – 34).

Claims 6, 17

Lakshman anticipates the applicable rules are found by ANDing the binary strings determined for each axis over all axes. (**Lakshman**, page 208, col 2, lines 10 – 34).

Claims 7, 18

Lakshman anticipates at least one hardware pipeline for conducting the search on an axis, the pipeline comprising first, second, and sequential modules for accomplishing increasingly particular portions of the search, wherein, after the first module of the sequential modules is used, determined values from the first module pass to the second module, and values for a second packet enter the pipeline at the first

module, the pipeline operations proceeding thus sequentially. (**Lakshman**, page 208, col 2, lines 36 – 39; page 209, col 1, lines 1 – 26).

Claims 8, 19

Lakshman anticipates parallel pipelines with one pipeline dedicated to searching on each axis in the N-dimensional space, wherein searches are conducted for applicable intervals simultaneously on each axis. (**Lakshman**, page 208, col 2, lines 36 – 39; page 209; col 1, lines 1 – 26).

Claims 9, 20

Lakshman anticipates applicable rules for each interval on each axis are represented by individual bitmaps, with each rule assigned a bit position, and wherein the outputs of the parallel pipelines, being the numbered interval on each axis into which the point for a packet projects, are exchanged for the associated bitmaps, which are then ANDed to determine the applicable rules. (**Lakshman**, page 208, col 2, lines 36 – 39; page 209; col 1, lines 1 – 26; page 208, col 2, lines 10 – 34).

Claims 10, 21

Lakshman anticipates searching is interleaved, results of searching on one or more axes being applied to other axes before searching on the other axes. (**Lakshman**, page 207, col 2, lines 55 – 57; Examiner's Note: Lakshman, using the best method related to the development of the system of Claim 1, extracts the jth element of every filter for all n filter rules where such element's reference must exceed one on the jth axis. In the conventional mathematical notation, if i is less than 1 or not defined, the respective jth axis has no value for the referenced rule. Since there must be an ith

value for each rule in the jth dimension, Lakshman's algorithm anticipates an efficient

search. The mathematical converse applicable to Lakshman's notation sets aside the

rule covering the instance wherein the rule does not have an interval on one or more k

axes.)

Claims 11, 22

Lakshman anticipates rules that are found by search to not apply on one or more

axes are not considered in searches conducted on the other axes (**Lakshman**, page

207, col 2, lines 55 – 57; see above notation).

Claim 12

Lakshman anticipates projecting the rules as N-dimensional entities on N axes in

dimensional space (**Lakshman**, page 207, col 2, lines 55 – 60); marking the beginning

and ending value on each axis for each rule as a breakpoint (**Lakshman**, page 208, col

1, lines 7 – 10); numbering intervals arbitrarily on each axis sequentially in ascending

order with binary numbers (**Lakshman**, page 207, col 2, lines 45 – 63, page 208

including Fig. 2); identifying those breakpoints at which bits in the interval numbers

change (**Lakshman**, page 208, col 2, lines 10 – 34); associating a subset of the rules

as applicable in each interval on each axis (**Lakshman**, page 208, col 2, lines 10 – 34);

considering a packet as a point in the N-dimensional space according to values of the

header fields for the packet (**Lakshman**, page 203, col 2, lines 29 – 35); determining by

search the binary numbered interval on each axis into which the packet point projects

(**Lakshman**, page 203, col 2, lines 29 – 35; page 208, col 2, lines 10 – 34); substituting

the subset of rules that apply for each determined interval (**Lakshman**, page 208, col 2,

lines 10 – 34); and selecting those rules as applicable to the packet that associate to the packet on all of the N axes (**Lakshman**, page 208, col 2, lines 10 – 34).

Claim 23

Lakshman anticipates conducting a first search on one or more axes (**Lakshman**, page 209, col 2, lines 56 – 62); and using information from the first search to simplify further searching on remaining axes (**Lakshman**, page 203, col 2, lines 19 – 25).

Conclusion

8.   Claims 1-23 are rejected.

Correspondence Information

Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner, Joseph P. Hirl, whose telephone number is (703) 305-1668. The Examiner can be reached on Monday – Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, John Follansbee can be reached at (703) 305-8498.

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

or faxed to:

(703) 746-7239 (for formal communications intended for entry);

or faxed to:

(703) 746-7240 (for informal or draft communications with notation of

"Proposed" or "Draft").

Hand-delivered responses should be brought to:

Receptionist, Crystal Park II

2121 Crystal Drive,

Arlington, Virginia.

Joseph P. Hirl

April 16, 2003

Wilbert L. Starks, Jr.
Primary Examiner
Art Unit - 2121